

REMARKS

The non-elected claims 1-6, drawn to a packed column, have been withdrawn.

The Examiner has objected to the drawings for the reason that Fig. 4 was omitted and two copies of Fig. 1 were filed. To correct this informality, Fig. 4 of the drawings is submitted herewith.

Claims 7-11 stand rejected under 35 U.S.C. 112, second paragraph, for the reason that independent claim 7 does not set forth any steps involved in the claimed method. Claim 7 has been amended to recite the method step of employing a packed column provided with a packing support plate, a packing layer (A), and a packing layer (B) to absorb, distillate and strip a polymerizable compound or a liquid of a polymerizable compound, or extract a polymerizable compound. Accordingly, the rejection of claim 7 and dependent claims 8-11 under 35 U.S.C. 112, second paragraph, should now be obviated.

Claim 11 stands further rejected under 35 U.S.C. 112, second paragraph, for the reason that the cross-sectional area of the column is not specifically identified. Claim 11 has been amended to call for the cross-sectional area of the column at a position where the corrugated packing support plate is provided and thus should now overcome the rejection under 35 U.S.C. 112, second paragraph.

Claims 7, 9 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hardison (U.S. 5,296,205) in view of Nishimura et al. (U.S. 6,620,969); and claim 8

stands rejected under 35 U.S.C. 103(a) as being unpatentable over Hardison and Nishimura et al., and further in view of Leva et al. (U.S. 4,814,117).

First, it is noted that effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person". This change to 35 U.S.C. 103(c) applies to all utility, design and plant patent applications filed on or after November 29, 1999. Since the present application was filed on October 16, 2000, and has been assigned to the same party as the Nishimura et al. reference, namely Nippon Shokubai Co., Ltd., the Nishimura et al. reference is disqualified as prior art against the present claimed invention.

Accordingly, the rejection of claims 7-10 based on a combination of references, including Nishimura et al., should now be obviated.

It is submitted that the teachings of Hardison fail to render obvious or even suggest the novel recitations in claims 7-11, as amended herein, and new claims 12 and 13. Hardison discloses a packed mass transfer tower for establishing intimate gas-liquid contact and efficient mass transfer that is less susceptible to gas or liquid channeling, gas surging and uneven distribution of gas or liquid across the cross-sectional area of the tower. In one embodiment, the packed tower includes a packing arrangement including a loosely packed bed of mobile packing material, and an adjacent, tightly packed bed of mobile packing material. The relatively tightly packed bed of mobile packing material

acts as a gas distributor, as well as being a material that causes good gas-liquid contact, to provide an even flow of gas across essentially the entire cross-sectional area of the loosely packed bed of mobile packing material.

The Examiner has recognized that as to a packing arrangement of a column such as a packed column, a packing arrangement claimed in the present application is similar to a reverse arrangement of a partial packing arrangement described in Hardison. However, Hardison has no disclosure of the subject matter of the present application and no description that suggests technical features even close to the subject matter of the present application.

Therefore, even when one of ordinary skill in the art examines Hardison carefully, it is impossible for him/her to conceive the adoption of a reverse arrangement of the partial packing arrangement described in Hardison to a procedure for purifying a polymerizable compound. That is, the subject matter of the present invention is not described or suggested in Hardison, and thus the present invention is not obvious from the teachings of Hardison.

The present invention adopts a reverse arrangement of a packing arrangement somewhat like that disclosed in Hardison. Unlike the present invention, however, Hardison is totally silent about such a reverse arrangement.

Hardison only discloses an arrangement in which a gas supplied from below flows upwardly. To make the invention of Hardison effective, an arrangement in which a tight packing layer (tightly packed bed) 24 is provided between a loose packing layer (loosely

packed bed) 22 and a support plate (grid) 21 must be prepared. In other words, Hardison merely discloses that gas components are first distributed uniformly in the tight packing layer 24, and then, good gas-liquid contact is performed in the loose packing layer 22 above the tight packing layer 24.

In contrast, an object of the present invention is to prevent polymerization of a liquid stopping flow-down and retained by gas flow right above the support plate. Thus, the present invention has an arrangement in which the packing layer (B) having a greater percentage of voids is provided right above the support plate, which clearly is unobvious and patentable subject matter.

That is, Hardison discloses an arrangement in which gas is uniformly distributed in the tight packing layer 24 right above the support plate 21 so as to perform good gas-liquid contact in the loose packing layer 22, and thus Hardison does not disclose or suggest the object and technical idea of the present invention.

In Figure 2 of Hardison, when viewed from the support plate (grid) 20, the loose packing layer 22 is provided between the tight packing layer 24 and the support plate 20. When viewed from a support plate 21 at a lower position of the support plate 20, however, the tight packing layer 24 is provided between the loose packing layer 22 and the support plate 21. In this arrangement, the positions of the packing layers reverse the positions in the new and improved arrangement of the present invention. This reverse arrangement is an arrangement to achieve an intended effect of Hardison.

The effect achieved by the tight packing layer 24 of Haridson is to uniformly distribute gas which flows upwardly from below, toward the loose packing layer 22 (Column 3, lines 18-26). Further, as to the gas, the property of flowing upwardly from below is described in column 5, lines 13-20.

Thus, a basic arrangement of Hardison is an arrangement such that when viewed from the bottom of the packed column along the gas flow direction, the support plate 21, the tight packing layer 24, (support plate 20), and the loose packing layer 22 are provided in this order. In Hardison, this basic arrangement is repeated several times in the packed column. The support plate 20 is a partition for preventing a flowing packing from being mixed into a packing layer right above the packing. In contrast, in the present invention, a support plate is not provided between the packing layers (A) and (B) since the packing making up the packing layers (A) and (B) of the present invention does not flow. In the present invention, a hold-down grid 7 is provided above a packing layer 8 (see page 5, lines 15-17 of the specification).

Further, In Figure 3 of Hardison, in the case where a heavy (= tight) packing layer 31 is above the support plate 20, there exists no support plate between the packing layers. In such an arrangement where no support plate is provided between the packing layers, the support plate 20, the heavy (= tight) packing layer 31, and the loose packing layer 22 are provided in this order. It is clear that this arrangement is a reverse arrangement of and is significantly different from the present invention.

As hereinbefore discussed, it is not appropriate to recognize that an arrangement equivalent to an arrangement of the present invention is disclosed in Hardison for the reason that, when viewed from the support plate which is not necessary in the present invention, provided between the packing layers, the loose packing layer is disposed between the tight packing layer and the support plate. In other words, when the arrangement in Figure 3 of Hardison in which the support plate is not provided between the packing layers is compared to the arrangement of the present invention, it is clear that the arrangement disclosed in Hardison is very different from that of the present invention.

Further, an object of the present invention is to prevent polymerization of a liquid stopping flow-down and retained by gas flow right above the support plate. To achieve this object, the packing layer (B) having a greater percentage of voids is disposed right above the support plate, so as to facilitate flowing of gas and liquid.

On the other hand, an object of Hardison is to prevent liquid channeling and gas surging which cause sinking and fouling of packing material particles in the packed column. To achieve this object, gas is first distributed uniformly in the tight packing layer 24 above the support plate 21, and good gas-liquid contact is then performed in the loose packing layer 22.

Thus, the object of the present invention is different from that of Hardison, and the packing layers inside the packed column are disposed in reverse order.

The Examiner has pointed out in the Office Action on page 4, lines 9-12 that
"While Hardison does not specially teach the use of his column for easily polymerizable

compounds, such use is clearly suggested (Column 1, lines 44-49)." However, it is impossible to conceive the subject matter of the present invention of treating a polymerizable compound for the purpose of preventing its polymerization, on the basis of the descriptions of Hardison, column 1, lines 44-49.

Therefore, even when the above descriptions of Hardison are examined carefully, it is impossible to derive the use of a packed column, as a purifying device, having a particular packing arrangement described in claim 7 of the present application, in treating a polymerizable compound for the purpose of preventing its polymerization.

More specifically, on the basis of the following description in Hardison: *when particulates are formed within the tower as a result of a chemical interaction* (column 1, lines 46-47), the Examiner has recognized that the use of packing and others described in Hardison for solving the problem of polymerization of acrylic acid, its derivatives, and others is indicated. However, Hardison thoroughly discloses the arrangement in which gas is distributed uniformly in the tight packing layer 24 located right above the support plate 21 for good gas-liquid contact in the loose packing layer 22. Therefore, from this disclosure, one could merely arrive at the idea that the packed column described in Hardison (Figures 1-3) could be used for purification of acrylic acid, its derivatives, and others, based on an idea that "the packed column described in Hardison might enable treatment of a polymerizable compound".

As previously stated herein, Nishimura et al. does not qualify as prior art for judgment of obviousness (35 U.S.C. 103(c)). In addition, Nishimura et al. is totally silent

about a correlation between a packing arrangement of contents packed in the packed column in a purification procedure and susceptibility to polymerization of a polymerizable compound. Hence, neither Nishimura et al. nor Hardison suggest the subject matter of the present invention, i.e. the method of devising a packing arrangement in the packed column to prevent unwanted polymerization for packing or the like of a polymerizable compound.

Further, the Examiner has pointed out that the packed column in Figure 2 of Hardison is similar to that of the present invention. However, the packed column having a packing arrangement illustrated in Figure 2 can achieve the effect of Hardison (uniform distribution of gas in the tight packing layer 24 above the support plate 21 for good gas-liquid contact in the loose packing layer 22), but cannot achieve the object of the present invention, i.e. the effect of preventing polymerization for treating a polymerizable compound.

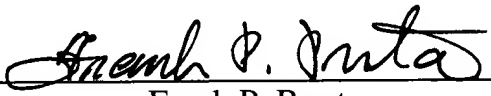
The patent to Leva et al. was cited by the Examiner for its secondary teaching of substituting the support plate as taught by Hardison with that of Leva et al. in order to maximize the total open area provided by the support plates. Applicants disagree with the Examiner's conclusion that the disclosure of Leva et al. can be seen to be a suggestion to place packing having a large percent of voids adjacent to the corrugated support plate as taught by Hardison. Even if this suggestion is accepted, however, Leva et al. clearly fails to supply the deficiencies of Hardison with respect to the novel limitations of the claims, as amended herein, and the new claims.

NISHIMURA et al.
Appl. No. 09/688,169
July 1, 2004

In view of the above amendments and remarks, it is submitted that all of the claims in the present application should now be allowable to Applicants, and formal allowance thereof is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 
Frank P. Presta
Reg. No. 19,828

FPP:cr
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100